

Appl. No.: 10/039,728
Amendment dated January 3, 2005
Reply to Office Action of October 1, 2004

REMARKS/ARGUMENTS

Reexamination and reconsideration of this Application, withdrawal of the rejections, and formal notification of the allowability of all claims as now presented are earnestly solicited in light of the above claim amendments and remarks that follow.

Claim 1 has been amended to recite that the method modifies the metallic structure of the metal at and below the surface of the metal and this amendment is supported at page 2, lines 32-36 and page 5, line 26 to page 6, line 14 of the specification. Claim 17 has been amended to include titanium alloys and is supported at page 3, lines 6-9 of the specification. New claim 18 has been added and support for claim 18 is provided, for example, at page 5, lines 26-30 of the specification. Based on these amendments, claims 1-18 are pending in the present application.

Applicant notes and appreciates the Examiner's indication that claim 14 is allowable over the prior art of record. Applicant also notes that claims 3-6 and 8 are objected to on page 1 of the Office Action (presumably, since there is no rejection of these claims, because these claims contain allowable subject matter).

Claims 1, 2, 7, 12, 13, and 15-17 stand rejected under 35 U.S.C. §102(b) as being anticipated by PCT Publication No. WO 98/40542 to Gilroy or, alternately, by Japanese Patent No. JP 62158898 to Sone Yuji. Further, claims 1, 2, 7, 12, 13, and 15 stand rejected under 35 U.S.C. §102(b) as being anticipated by Japanese Patent No. JP 60128288 to Ishida Shinichi. Specifically, the Office argues the cited references disclose methods of treating a steel article by electrolysis in the presence of an electrolyte using alternating pulses of at least one of voltage and current, the pulses being of opposite polarity. Applicant respectfully traverses the above rejections.

The claimed invention, as presently amended, is directed to a method for treating a metal, wherein the method modifies the metallic structure of the metal both at and below the surface of the metal. By contrast, the cited references disclose methods of coating a metal surface, such as by electroplating. Specifically, WO 98/40542 and JP 62158898 teach methods of chromating a metal surface, and JP 60128288 teaches a method of forming a black coating on a metal surface by activating an oxide layer thereon.

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The presently claimed invention is not directed to a mere coating or deposition of another species on a metal surface, as described in the cited references. Rather, the present invention includes modification of the metallic structure of the metal both at and below the surface of the metal. This modification may involve a phase transformation or a relaxation of stresses within the metal surfaces (see page 5, lines 26-30 of the specification). As such, the method of the present invention could be considered a method of electrochemical annealing of the surface and near-surface material of the metal. The phrase "electrochemical annealing" is not intended to be a term of art but is rather a term coined by the inventor to describe the effect of the method of the invention. This "annealing effect" is more fully described at page 5, line 35 through page 6, line 14 of the specification.

The distinction of the presently claimed invention over the cited art is further exemplified at page 2, lines 32-36 of the specification, which describes the effectiveness of the invention in removing or transforming martensite at and below the metal surface in austenitic stainless steels. Such activity both at and below the metal surface is clearly distinct from electroplating and oxidizing methods, such as described in the cited art.

In contrast to the claimed invention, electroplating processes and processes which involve the formation of oxide films on the surface of a metal only affect surface metal atoms and do not affect metal atoms below the metal surface. In other words, the activity of the process is only at the surface of the metal (e.g., plating on the surface or forming an oxide layer on the surface), and the activity does not extend to the metallic structure below the outer surface. Even in the formation of the multiple oxide layers, the activity of the process continually occurs at the surface of the outermost layer (whether it is the initial metal layer or a formed oxide layer), and such activity does not extend to the metallic structure below the outer surface. The present invention, however, is distinct from such plating or coating methods as the method of the invention does not result in deposition of any metallic element onto the surface of the metal being treated (see page 3, lines 21-24 of the specification).

The presently claimed invention can be generally distinguished from electroplating and oxide forming methods. In particular, the method of the present invention does not result in the deposition of metallic layers on the surface of a metal, and the electroplating and oxide forming

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methods of the cited references do not result in the modification of the metallic structure of a metal at and below the surface of the metal, as presently claimed.

In light of the above general differences between the presently claimed invention and plating and coating methods in general, Applicant respectfully submits that none of the cited references teach or suggest each and every aspect of the presently claimed invention. The WO 98/40542 reference teaches a method for chromating the surface of metals having surface oxide layers comprising immersing the metal in a neutral or alkaline solution containing trivalent chromium ions and applying a series of pulses of electrical current between the metal surface acting as a cathode and an anode both located in the chromium ion solution. At page 4, lines 5-6, the WO 98/40542 reference specifically states that the disclosed method involves precipitation of chromium oxide on the metal surface. Similarly, JP 62158898 teaches the manufacture of stainless steel stock having a colored layer by the electrolytic treatment thereof using an aqueous solution of hexavalent chromium.

In contrast to the presently claimed invention, neither the WO 98/40542 reference nor JP 62158898 provide any teaching beyond electroplating a metal surface with chromium. As such, both the WO 98/40542 reference and JP 62158898 fail to teach or suggest modification of the metallic structure of a metal both at and below the surface of the metal, as claimed in the present invention. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the above-described rejections.

Additionally, JP 60128288 teaches the formation of a black film on the surface of aluminum or an aluminum alloy by activating an oxide film on the surface so as to change the structure of the oxide film. The modified oxide film is then subjected to further anodic oxidation in an electrolytic coloring bath to produce a black film. As with the other references, the activity of the method taught by JP 60128288 is limited to the surface of the metal. Accordingly, JP 60128288 fails to teach or suggest modification of the metallic structure of a metal both at and below the surface of the metal, as claimed in the present invention. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the above-described rejections.

Claims 9-11 stand rejected under 35 U.S.C §103(a) as being unpatentable over PCT Publication No. WO 98/40542 to Gilroy. As noted above in relation to the WO 98/40542

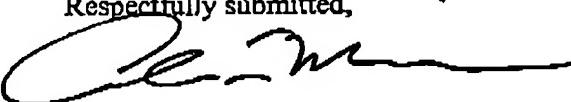
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reference, the reference fails to teach or suggest a method which modifies the metallic structure of a metal both at and below the surface of the metal, as claimed in the present invention. Given this failure to teach such a method as presently claimed, the subject matter of claims 9-11 would not be obvious to one of skill in the art in light of the teachings of the reference. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the above-described rejection.

Applicant respectfully submits that all claims as now submitted are now in condition for immediate allowance. Accordingly, a Notice of Allowance is respectfully requested in due course. If any minor formalities need to be addressed, the Examiner is directed to contact the undersigned attorney by telephone to facilitate prosecution of this case.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,

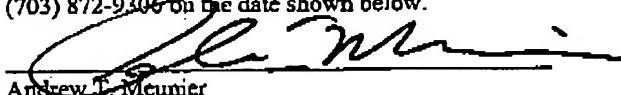


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1/3/05

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